* Data trans article sent out last week
* Signals are waves emulating away from antenna: abstract RF theory
* Let’s not do Maxwell’s equations
* Consider simple wave model from antenna to antenna
* Wave shape depends on antenna shape 🡪 Polarization
* Intuitive/geometric understanding as opposed to mathematical understanding
* Dipole antenna (classic/common antenna): has two poles (2 x monopoles)
  + Look like sticks: linearly polarized
  + Emanates in planes of signals, radially
  + More coverage than monopoles 🡪 **needs reason**
    - Radiate below and above
    - More expensive than monopole
  + Directional antennas are opposite (not radial)
* Crosshair antenna: directional
  + Good for far distances but limited direction
* Range or distance
  + Depends on directionality (gain) and frequency (higher frequency faster attenuate faster)
  + Attenuation: signals get weaker with distance
    - Can be measured by flus lines through area
    - Radially
* Antenna shape dictates antenna gain
  + Non directional: unity gain (i.e. 0)
  + Directional: High gain (12dB)
  + Decibel: logarithmic measure of signal strength (signals decay)
* Free space path loss: how signals carry
  + Several equations, look it up
  + Logarithmic: as distance increases, loss increases
  + TRC wants to hit 100km
* FM/AM
  + Frequency modulation: average frequency, then stretch and compress it to modulate 0s and 1s
    - Transmit at 900Mhz
    - Digital Packet Reporting
    - Higher frequency immune to noise and much smaller devices
  + Amplitude modulation
  + Digital signals over radio waves 🡪 analog signals
  + Power: increasing power increases gain
    - High power means big battery means more weight
* Digital Packet Reporting
  + There’s a bunch of protocols
* EMI/EMC engineering
* Antenna design for this year
  + Patch antenna
* Circularly polarized
  + Radial/corkscrew antenna
  + Right-hand, left-hand polarization
  + Linearly to circularly polarized pairing: 3dB loss
  + FPV: First Person View
* TRC
  + Baseline system for testing: TX 🡪 RX system
  + Change frequencies and antennas to gain understanding
  + High Frequency transmitters are cheap, low frequency transmitters are expensive